METHOD AND DEVICE FOR READING POSTAL ARTICLE INSCRIPTIONS OR DOCUMENT INSCRIPTIONS

5   CROSS REFERENCE TO RELATED APPLICATIONS

The present application is a continuation of international application PCT/DE2003/002796, filed 08/21/2003, which designated the United States and further claims priority to German application DE

10   10240034.2, filed 08/29/2002, the both of which are herein incorporated by reference.

BACKGROUND OF THE INVENTION

The invention relates to a method and a device for

15   reading postal article inscriptions and document inscriptions.

For automatic processing, for example sorting, of postal articles or documents, it is necessary to read their inscriptions. In the case of postal articles for

20   example, the image of the postal article surface is first of all recorded according to the prior art, or an image of the address section of the postal article is recorded specifically. The image data is then

25   transferred to a first OCR system for address identification, and possibly to further OCR systems for alternative address identification and to video coding systems if the upstream OCR systems cannot identify and code the address. If the address has been read, the OCR

30   or video coding system passes appropriate sorting information to the sorting machine, in order that it can sort the postal article appropriately. The postal article in this case has a sorting or identification

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code (ID code) sprayed onto it. In this case, the sorting information need not be identified during the sorting process (on-line), but may also be carried out with a time delay, via the ID code (off-line). In this

5   case, the letter is first of all provided with a unique ID code, which is subsequently linked to the identified address information. The OCR and video coding system is in this case coupled to the sorting machines via LAN or WAN networks. This also allows the remote operation of

10 a reading and video coding center, which is responsible for two or more machines, and even for two or more machine locations. Such remote reading and video coding centers are already in use, but are invariably operated by the respective postal service itself. When the

15 postal article traffic fluctuates severely, the postal service has to provide extensive reading equipment, which is utilized only at times.

SUMMARY OF THE INVENTION

20 The invention is therefore based on the object of providing a method and a device for reading postal article inscriptions or document inscriptions, which reduce the necessary reading complexity for the individual postal services, or for other services which

25 use corresponding reading processes.

In this case, the images are supplied from different customers together with the data accompanying the images relating to the postal articles or documents to

30 be read. Core data relating to each customer (postal service or other service) is stored such that it can be searched and contains at least the source of the

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images, the scope of the agreed reading steps and further services as service types and, in a cost model their costs, on agreement as a function of defined image attributes. The respective customer and the

5 respective reading task including the image attributes which are required for cost determination are determined before each reading process, from the data accompanying the images, and from the core data. The customer, the processing information relating to the

10 reading steps together with the reading and processing results, the determined image attributes and the data accompanying the images are stored such that they can be searched and sorted on a time-related basis after carrying out the reading process for each image. The

15 costs incurred are determined from the cost model contained in the core data by means of the stored data relating to the reading processes carried out, and are stored such that they can be sorted on the basis of service types of the cost model and/or on the basis of

20 time periods, and are output as invoices based on defined sorting criteria for each customer.

For more efficient operation, the postal services and other services are therefore provided with the

25 capability to carry out the reading and coding tasks by outsourcing. In this way, at times when the postal article traffic is uncertain, fixed costs are converted to variable costs, and the service automatically profits from new technical developments in the reading

30 and coding sector, and is independent of the life of the hardware and software used for this purpose. The operator of centralized reading functions, on the other

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hand, can provide this service for two or more services and customers, and furthermore, can likewise achieve saving effects. This makes it possible for the operator to provide, to verify and to invoice the reading and

5   coding operation as a function of the concluded service layer agreement, the data accompanying the images and the quality and nature of the images transmitted. In this case, the service may be provided at the same time for two or more services, that is to say for different

10   image data streams and with separate invoicing for each service.

Advantageous refinements of the invention are described in the dependent claims.

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By way of example, it is advantageous for the service types which are contained in the core data to be prioritized with regard to the processing including agreed processing time period for the customers. It is

20   thus possible to take account of different service agreements with the various services/customers, and their importance.

It is also advantageous for the stored data to be

25   processed statistically with the results from the service types carried out, corresponding to evaluations defined in the core data, and to be output to the customers as reports for the defined time periods.

30   In order to identify the source of the images to be read, it is advantageous to include tags for the image-producing devices in the data accompanying the

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images, which tags are in turn associated with the individual customers.

It is also advantageous for the images and the reading results to be associated with the postal articles or documents by means of identification tags, which are applied legibly to the postal articles or documents. The addresses which are read on the postal articles are advantageously output as address codes which are verified by means of address directories.

The invention will now be explained in more detail in the following text, using an exemplary embodiment and with reference to the drawings. This example relates to the reading of postal article inscriptions in the course of sorting and distribution processes in the Post Office, although this does not imply any restriction.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS
In the figures:

Figure 1   shows the dataflow between one of the postal services with image recording equipment and a reading device with OCR and video coding device as a service system,

Figure 2   shows the dataflow between one of the postal services with image recording equipment and OCR, and the reading

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device with OCR and video coding device
as a service system,

Figure 3   shows   the   interface   between   a   postal
5   service and the reading device, and

Figure 4   shows   the   dataflow   and   process   sequence
within the reading device.

10   DETAILED DESCRIPTION OF THE INVENTION
The method requires data storage, checking, searching,
comparison, sorting and other data manipulations which
are made possible by the use of a computer system. This
computer   system   may   be   programmed   appropriately   by
15   specialist   personnel.   A   computer   system   in   this   case
comprises   one   or   more   computers   with   known   components,
such   as   a   memory,   an   input   interface,   an   output
interface,   a   processor,   software   and   communication.   Two
or   more   computers   can   split   the   task   between   themselves
20   by   means   of   appropriate   networking.   The   network   may   in
this   case   be   a   local   LAN   or   WAN.

Figure 1 shows the dataflow of an image with associated
information.   The   image   is   generated   by   an   image
25   recording   appliance   2,   which   is   located   on   a   sorting
machine,   or   by   a   camera   if   the   customer   1   is   a   postal
service,   and   is   then   transmitted   via   a   LAN   or   WAN   link
to   the   service   system   3   for   reading   the   postal   article
inscriptions,   together   with   information   accompanying
30   the   images.   In   the   service   system   3,   the   inscription   is
read   by   means   of   OCR   devices   4   and,   if   they   do   not
produce   a   unique   result,   it   is   read   by   means   of   a   video

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coding device 5, and the result is passed back as sorting information to the postal service, as the customer 1, for the purpose of correct automatic sorting.

5   Figure 2 shows another option which comprises the service being reduced to the reading (OCR and video coding) of images which the postal service, as the customer 1, has not been able to read using its own OCR devices 7. In this case, a first or even second OCR

10   device 7 of the postal service, as the customer 1, reads the address or other postal article information. If no result is found in this process, the image is transferred to the service system 3. An OCR device 4 installed here now attempts to read the image using

15   alternative algorithms. If this is unsuccessful, the image is video-coded. The sorting result is then passed back again to the postal service, as the customer 1, for sorting.

20   Figure 3 shows the interface between one of the postal services, as the customer 1, and the service system 3. In this case, a data protocol 8 is passed via the interface, and contains both images 9 in typical image compression format (tiff, jpg, etc.) and data 10

25   accompanying the images. In this case, the protocol may be designed such that the data 10 accompanying the images is transmitted in a form applicable to two or more images 9, or such that the data 10 accompanying the images is transmitted for each image 9, as is shown

30   in the drawing. The data 10 accompanying the images may now be used in order to carry out the reading process optimally for the service task by means of the OCR

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device 4 and video coding device 5, based on the service layer agreement SLA. A further option is for the postal service, as the customer 1, to have the capability to order special service functions with data

5   10 accompanying the images for individual postal articles or quantities of postal articles, for example the automatic return of forwarding information as sorting information. The data 10 accompanying the images is used, in compliance with the service layer

10 agreement, for invoicing to the postal service as the customer 1.

Typical data 10 accompanying the images comprises descriptions of the sorting environment or additional orders, such as:

15 ➢ unique number of the sending machine/image recording appliance of the postal service

➢ only sender sorting/read postcode necessary

➢ sender and receipt sorting/complete read address necessary

20 ➢ time interval within which a sorting result must be available

➢ postal article priority

➢ automatic forwarding processing

➢ etc.

25 This data is typically produced by the respective postal service's computer system, for example by the first OCR device 7 or by the machine controller for the sorting machine.

30 The data 10 accompanying the images together with the core data 16 which is stored in a core data databank 11 in the service system 3, as well as the information

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from the image 9 control the service procedure and determine, for example, which coding tasks are necessary, and with what priority. The core data 16 is in this case typically:

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- ➢ associations between a machine identification and the postal services
- ➢ association between the machine identifications and language areas (for example, French, German) in the country of the postal service
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  (for example in multilingual countries)
- ➢ scope of the service layer agreement
- ➢ required quality of service
- ➢ machine configurations for passing on the results (off-line coding)
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- ➢ prioritization of the service layer agreement in comparison to the service layer agreements of other postal services.

If, for example, it is found that the sorting machine
20 which is sending the postal article information with an image is located in a French-speaking part of a country, then French-speaking, trained video forces receive the images for carrying out the identification task. If the service layer agreement does not allow
25 separate payments for high-priority and low-priority postal articles, then the postal articles are not given any priority despite appropriate information in the data accompanying the images.

After processing in the service system 3, the data 10
30 accompanying the images is used together with the core data 16 for calculation of the service fee and for verification of the service quality.

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As can be seen from Figure 4, the service system 3 can be designed to carry out reading processes for various postal services A, B, C as the customer 1. In this

5   case, the method for the service must ensure that the postal article information (images 9 and data 10 accompanying the images) sent by the respective postal service 1 leads to the result being passed back again to the correct customer 1.

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Figure 5 shows, in detail, the dataflow within the service system 3: the service system 3 receives all of the images 9 and the data 10 accompanying the images from one postal service, or from two or more postal

15   services in parallel, as the customer 1. The OCR device 4 and the video coding device 5 process the images 9 controlled by the data 10 accompanying the images, and controlled by the core data 16, from the core data databank 11, on which the service layer agreement is

20   based. As already described above, the required reading or coding step is activated, and the processing is prioritized, on the basis of the data.

The reading and coding result 12 is passed back in the

25   form of sorting information/an address code or in some other form of the reading result to the relevant postal service 1. These need not be the same machines as those from which the images 9 and the data 10 accompanying the images originally came. In the course of the

30   off-line coding process described above, the reading and coding results 12 can also be passed back to a different sorting machine for the postal service as the

customer 1, controlled by the core data 16 in the core data databank 11. If it is not possible to read and video-code the image 9 automatically (for example if no video coding service is offered), the image 9 may also
5   be passed back as the result 12 in order that, if appropriate, the postal service can task its own video coding personnel with the reading of the image. After the reading process, the data 10 accompanying the images is entered in a service databank 13, and is used
10   as the basis for documentation and invoicing. Information can be stored as follows in the service databank 13:

> number of letters relating to a data item accompanying an image
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> unique letter Ids (identifications) for the data item accompanying the image
> order delivered at the same time (for example forwarding, input coding, etc.)
> information for the processing process (result
20   of the postal service OCR, priority of the postal articles in the post process, etc.)
> identification of the supplying machine
> time window for on-line or off-line processing

25   Processing information 14 relating to all the reading/processing steps is likewise supplied to the service databank 13, having the following information for this purpose:
> name/type of reading/processing step
30
> number of images for this reading/processing step
> date/time of the reading/processing step

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> ➢ optionally: duration of the processing step
>
> ➢ result of the reading/processing process.

Reading/processing steps may be:

> ➢ receipt of the data
>
> ➢ sender coding by the 2nd OCR
>
> ➢ input coding by the 2nd OCR
>
> ➢ sender coding by interactive video coding based on the determination of the "Region of Interest" (zone on the image where the address information is located)
>
> ➢ input coding by interactive video coding based on determination of the zip code (post code)
>
> ➢ input coding by complete video coding
>
> ➢ forwarding coding by the 2nd OCR
>
> ➢ etc.

In parallel with the processing information 14, the service databank 13 also receives information about the respective image characteristic and quality as a so-called image attribute 15. The image attributes 15 are likewise used to verify the quality of service and are the basis for invoicing.

Typical image attributes 15 may be:

> ➢ handwritten addresses
>
> ➢ machine-written addresses
>
> ➢ dark envelope
>
> ➢ window envelope
>
> ➢ priority note
>
> ➢ electronic release
>
> ➢ no postage stamp
>
> ➢ redirection address

> ➢ incomplete address

> ➢ etc.

5   The service databank 13 stores the information as follows:

> ➢ unique identification (identification number) of the postal article

> ➢ characteristics of this postal article.

10 Another option for storage of the data would be:

> ➢ characteristic of a postal article

> ➢ counter for the number of postal articles with this characteristic.

15 An evaluation device 17 uses the data from the service databank 13 to produce reports and invoices 18. This is done by accessing the core data 16 in the core data databank 11.

It uses all of the machine identifications entered
20 there for a postal service as the customer 1 to determine from the processing information 14, the data 10 accompanying the images and the postal article attributes 15 the complete scope of the service provided, and matches this to the contractually agreed
25 service layer agreement, stored as core data 16 in the core data databank 11. All of the services that are provided and those that are not provided can now be documented in comparison to the requested services and, for example, may be presented in the form of a
30 statistical evaluation report.

This includes, for example:

> ➢ actual reading rate and required reading rate

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> actual response time and required response time
> actual failure time and required failure time
> actual range of postal articles (percentage distribution of postal article attributes per 1000 or more postal articles) and contractually agreed postal article spectrum as the basis of the service
> actual reading rate per postal article attribute, and the required reading rate per postal article attribute, etc.

The core data databank 11 furthermore receives information about contractually agreed payments for services provided. The services provided are defined by the processing information 14 relating to the reading/processing steps carried out, the postal article attributes 15 and orders in the course of the data 10 accompanying the images.

These payments may be stored in the following form in the core data databank 11:

> costs per image read
> costs per handwritten address rate
> costs per missing postage stamp identified
> costs per image which has been processed by the 2nd OCR and by the video coding system
> costs per image which has been processed only by the 2nd OCR,
> costs per forwarding address
> costs per image which was coded on dispatch
> costs per image which was coded on receipt,
> or a supplement for a different range of postal articles.

The evaluation device 17 uses the core data relating to agreed payments, the information 14 relating to the reading/processing steps actually carried out,

5   determined postal article attributes 15 and transmitted data (order data) 10 accompanying the images to determine the invoice amount for the service provided per customer, that is to say per postal service 1. In this case, this is added up over the time period for

10   which the service is provided.

Both the reports relating to the provision of the service and the invoicing 18 may be transmitted to the respective postal service 1 in electronic form or in physical form (by means of a print-out).

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It should be stated that the detailed procedure described above may be varied within the scope of the invention. In particular, the result of a reading and coding task need not necessarily be a sorting result

20   and, in fact, the service may also relate to other features associated with a postal article (postage stamp identification, sender identification, etc.) or to images of documents outside the postal field (forms, signatures, etc.). The organization and composition of

25   the databanks may also differ from the example described above, while observing optimization processes for the databank. However, this difference does not call into question the inventive essence of the system, of carrying out a reading task in accordance with a

30   service.